EMS Annual Meeting Abstracts
Vol. 15, EMS2018-491, 2018

Analysis of mid-latitude cyclonic system precipitation using satellite-derived precipitation measurements

Gregor Skok (1) and Veronika Hladnik (2)

(1) University of Ljubljana, Faculty of Mathematics and Physics, Ljubljana, Slovenia (gregor.skok@fmf.uni-lj.si), (2) Slovenian Environment Agency, Ljubljana, Slovenia

Cyclonic systems and the associated weather fronts are extremely important for the day-to-day weather in the mid-latitudes. They can often bring strong winds and heavy rain which can have large socio-economic impacts. In fact, in the mid-latitudes, the majority of precipitation can be linked to frontal systems associated with cyclones. In the study the CMORPH satellite-derived precipitation measurements were used to estimate the precipitation contributed by mid-latitude cyclonic systems. The analysis was done in two parts, first by applying an object-based identification algorithm to the precipitation data. Secondly, by developing a new algorithm for identifying the locations and extent of the cyclones using ERA-interim reanalysis mean sea lever pressure fields and then associating the precipitation objects with the nearby cyclonic systems. This enabled the estimation of the amount and location of precipitation associated with each mid-latitude cyclonic system. In total, data from a period of 11-years was analyzed in the mid-latitudes spanning between 30° and 60°. Analysis showed that about 60 % of total precipitation is contributed by the cyclones in mid-latitudes. In some regions these could be more than 90 % (e.g. N Atlantic and N Pacific). The satellite-derived cyclonic precipitation measurements were also compared to ERA-interim cyclonic precipitation. Over the ocean the agreement between the two datasets is generally good with reanalysis slightly underestimating the cyclone precipitation, while over the land the difference is larger with reanalysis overestimating the cyclone precipitation. Analysis also showed that more than 50 % of cyclones are producing more than 1 km3/3h of precipitation. In both datasets the cyclones contain a majority of the high intensity precipitation present in the mid-latitudes.